

EXAM 01 PRACTICE QUESTIONS

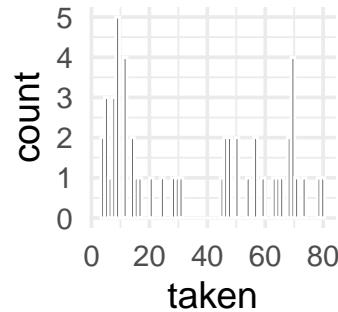
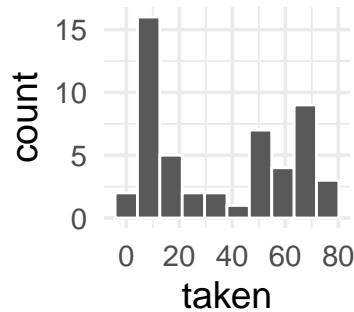
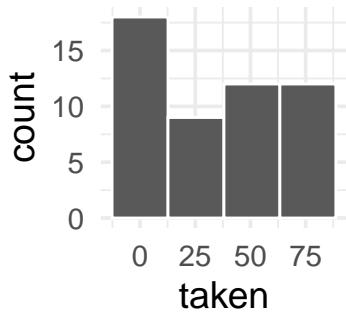
Stat 120 | Fall 2025

Prof Amanda Luby

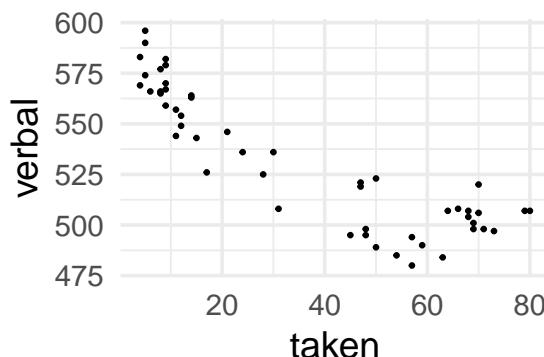
This dataset gives education-related data for the 50 states and the District of Columbia. The variables are:

- region: West, Northeast, Midwest, South
- pop: Population, in 1,000's
- verbal and math: average SAT verbal and math scores
- taken: percent of students taking the SAT
- noHS: percent of population with no high school diploma
- teachersPay: median teacher salary, in 1,000's

- a) Label each variable as categorical or quantitative
- b) How many columns and rows are there in this dataset?
- c) Is this an experiment or observational study?
- d) Below is the distribution of taken represented by 3 histograms. Choose the histogram that best represents the data and then describe the distribution.



- e) Below is the scatterplot of verbal against taken. What do you think is closest to the actual correlation? Choose one: -1.1, -1, -.9, -.6, -.1, .1, .6, .9, 1, 1.1



- f) What do the points in the *upper left* part of the graph represent? What about the *lower right*?
 g) Below is the linear regression model output for this data. Write out the linear regression equation and interpret the slope and intercept in context.

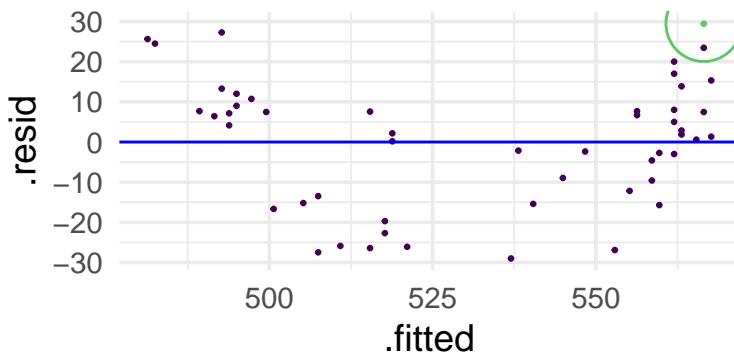
Call:

```
lm(formula = verbal ~ taken, data = sat)
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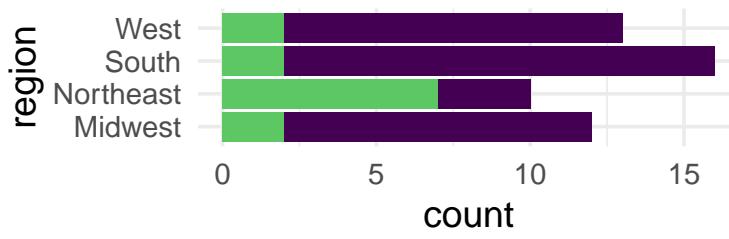
Coefficients:

(Intercept)	taken
572.21	-1.14

- h) Below is the residual plot for this model. Do you have any concerns about the validity of the model?



- i) One point on the residual plot is colored in green and circled. Give the \hat{y} , ϵ , y , and x value for this data point.
 j) The mean of teachersPay is 35.89, the median is 35, and the standard deviation is 6.226. The distribution is approximately symmetric and bell-shaped. Approximately how many states have teachersPay between 29.66 and 42.12?
 k) The graph below displays region filled by a new variable, pay40: whether teachersPay is greater than 40.



pay40 FALSE TRUE

- k) Find the conditional distribution of pay40 for the Northeast region

- l) Estimate the proportion of Midwest states with a median teacher pay less than 40.
- m) Find the marginal distribution of pay40
- n) Does there appear to be a relationship between pay40 and region?

There will also be a few *conceptual* true/false or multiple choice questions that are *not* connected to the data analysis.